

NOTES ON THE POLYZOA, STOMATOPORA, AND PROBOSCINA GROUPS, FROM
THE CORNBRAsh OF THRAPSTON, NORTHAMPTONSHIRE.

BY GEORGE ROBERT VINE.

In his illustrations of the "Geology of Yorkshire,"* Mr. John Phillips referred only one species of Polyzoa to the "Zoophyta" group, which he found adhering to fossils derived from the Cornbrash Rocks of the Yorkshire coast. This species Phillips named *Cellaria Smithii*. "It seems," the author says, "to belong to the genus hippothoa, Lamx., see his Expos. Meth. t. lxxx., fig. 16, Scarborough, attached to cardium citrinoideum." Phillips.

In Mons. Jules Haime's description of the "Fossil Bryozoa of the Jurassic formation,"† the author only cites one species (p. 180), *Berenicea lucensis*, as found in the Great Oolite, Hampton Cliffe, and also in the Bradford Clay and Cornbrash.

From material, at that time in my possession, and also from a careful study of the Polyzoan fauna preserved in the cases of the Museum of Practical Geology, Jermyn Street, I was able to record, and partially describe, in my third "Report on Fossil Polyzoa,"‡ the following Cornbrash examples:—

1. Stomatopora Waltoni, Haime Cornbrash, Stanton.
2. „ dichotoma, Lamx „ „
3. Terebellaria ramosissima, Lamx „ „
4. Diastopora microstoma, Mich (?) „ „

In another paper on the "Jurassic Polyzoa found in the neighbourhood of Northampton"|| I also described amongst others, and partly illustrated, the following species:

1. Stomatopora Waltoni, Haime, Cornbrash, Bedford.
2. Diastopora Oolitica, Vine „ „
3. „ Davidsoni, Haime „ „
4. Terebellaria ? *increscens*, Vine.

* Ed. 1229, p. 143, pl. vii., figs 7, 8. † Geol. France, 2r. ser., tom. v., 1854.
‡ Brit. Assoc. Reports, 1882-3. || Jour. Northampton Soc. Nat. History, 1886.
The species described are preserved in the Northampton Museum.

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Since these papers were written I have been allowed to examine, study, and select, from more than six hundred fossils, a certain number on which Polyzoan encrustations were found. The whole of these fossils belonged to Mr. Thomas Jesson, F.G.S., to whose previous kindness, by way of loans and gifts, I owe so much. Altogether, on the 600 fossils, there were considerably more than 1,200 colonial polyzoan growths ; and the whole of these were of such varying habits that I almost despaired of ever being able to fix the types for serial description. However, rather than further delay the publication of notes on the Cornbrash Polyzoa, I make a provisional selection of two groups, Stomatopora and Proboscina, in the hope that at some future time I may be able to add to the present list of species.

Before I give a detailed examination of the Cornbrash Stomatopora and Proboscina, I think that it will be both wise and useful to future students if I give preliminary studies of the peculiarities of the Jurassic forms already described, especially as regards British rocks.

The Genus *Stomatopora*, Bronn. (1825), may be considered as equal to the Genus *Alecto* (1821), previously described by Lamouroux ; the reason assigned for the change of name was, that Leach (1815) had already used the term *Alecto* for an altogether different group of fossils. In his "Petrifactions of Germany" Dr. Goldfuss employed the word *Aulopora* for Jurassic species, properly belonging to the *Stomatopora*, or "Alecto" group. Up till 1848 the whole of these generic terms were indifferently used by authors. Milne Edwards, Johnstone, and d'Orbigny (Prodr. de Palæont.) used the word *Alecto*, and Reuss (Foss. Polyp. der Wiener.) employed the term *Aulopora*. In his Palæont. Française, Terrains Crétacés (1852) d'Orbigny used the word *Stomatopora* for all those uniserial species which were found encrusting foreign bodies, not only in the Cretaceous rocks of France, but in other horizons as well. Altogether twenty-two species are accounted for, and as the synopsis which prefaces the descriptive text of the author gives the status of our knowledge of this group up till 1852, including the Cretaceous species, it may be useful to insert the list here, in d'Orbigny's own phraseology :*

* Op. cit. p. 834, Ed. 1852.

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10a	Stage	Bajocian	...	2	Species	(Jurassic series.)
11	„	Bathonian	...	2	„	(„ „)
14	„	Corallièn	...	3	„	(„ „)
17	„	Néocomien	...	3	„	(Cretaceous,,)
20	„	Cénomaniën	...	5	„	(„ „)
22	„	Sénonien	...	3	„	(„ „)
24	„	Suessonien	...	1	„	(Tertiary series)
26	„	Falunien	...	3	„	(„ „)

Since this synopsis was drawn up, Uniserial Stomatopora have been described in the Quarterly Journal of the Geological Soc., and Transac. of Yorkshire Geol. Soc. by myself, where full references will be found of species derived from the Wenlock shales of Shropshire, and from American Silurian and Devonian Rocks, by Mr. E. O. Ulrich, Prof. H. A. Nicholson, Mr. Hall, and other American writers.

M. Jules Haime's monographical description of the "Bryozoaires Fossiles de la Formation Jurassique,"* the author described and illustrated seven species of Uniserial Stomatopora; but as I wish now to deal with British forms only, I give the names and references to those British species, examples of which Haime had before him when he wrote.†

1. *Stomatopora dichotoma* (Op. cit. p. 160, pl. vi., fig. 1, a to d)
2. „ *Waltoni* („ „ p. 162, „ „ „ 3, a to b)
3. „ *dichotomoides* („ „ p. 163, „ „ „ 7)

In my third British Association Report (1882-3), as previously referred to, I was able to add to the British list, two new names :

4. *Stomatopora antiquata*, Haime (Juras. Bryoz. pl. vi., fig. 7).
5. „ *dilatans montlivaltiformis* (B. A. Rep., p. 251).

In a paper "On Some Polyzoa from the Lias (Quart. Jour. Geol. Soc., vol. xliii., p. 636, pl. xxv., fig. 10), Mr. E. A. Walford described, from the Middle Lias, King's Sutton, a *Stomatopora* sp., but in a footnote he says "I have found the same species in the Inferior Oolite of Dorset," and for this reason he was induced to name the Lias form :

6. *Stomatopora elongata*, Walford (Q. J. G. S., 1887, p. 636).

In another paper (on some "Bryozoa" from the Inferior Oolite of

* Ed., 1854, Paris.

† All the British type examples of Haime are preserved in the Walton Collection of Jurassic Polyzoa in the Woodwardian Museum, Cambridge.

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Shipton, Dorset (Q. J. G. Soc., vol. xlv., 1889, pp. 561 — 574), Mr. Walford described several species and varieties of Stomatopora, of which the following are new :

7. Stomatopora spirata (op. cit. p. 564, pl. 18., figs. 6, a. b.).
 ,, dichotomoides d'Orb.
8. ,, var. attenuata (op. cit. p. 564, pl. xviii., f. 91).
9. ,, porrecta (op. cit. p. 565, pl. lxxviii., f. 7 & 8.)

These nine species, then, represent the whole of the Uniserial Stomatopora known to me, up to date (1892), which have been recorded or described from the British Jurassic Rocks.

The Cornbrash Uniserial Stomatopora, which will now be described in full, were adherent to a variety of fossils, including species of Echinodermata, Terebratula, Ostræ, and other fossils. On the Ostræ some of the forms were found on the insides of the valves (dead shells), whilst other examples luxuriate in the folds of the outer portions of the same or similiar shells.

Sub-Order CYCLOSTOMATA, BUSK.

Division Parallelata, Waters.

Genus STOMATOPORA.

1825. Stomatopora, Bronn., Pflanzenth., p. 27.

1. Stomatopora, Phillipsii, sp. n., pl. (XII.), figs. 1, 1a, 2, 2a, 3, 3a.

Zoarium encrusting, linear or branched ; branches diverging from the distal extremity of the cell, generally in a line with the oral aperture, and not from the sides of the parent cell, like ordinary *Hippothoa* species. *Zoecia* pyriform, smooth, slightly prolonged at the base, middle portion raised or inflated towards the distal extremity, by which the oral aperture is occasionally obscured ; each zoecium measures about $\frac{1}{80}$ of an inch in length.

Horizon and Locality : Cornbrash, Thrapston.

Habitat : On Terebratula obovata.

In all probability the above may be considered as identical with Phillips' *Cellaria Smithii*, Geol. Yorksh., p. 143, pl. vii., but in the absence of positive evidence, I dedicate the species to the memory of the author of the Geology of Yorkshire. I do not think, however, that there can be any doubt about the Cyclostomatous

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character of *Stomatopora Phillipsii*. Forms of both fossil and recent polyzoa, in some respects similar to the present one, have been placed in the Genus *Terebripora* d'Orb, or *Hippothoa* Lamx., indeed, Philips suggests that his species may be a member of the Hippothoa group, and Mr. Hincks,* though doubtfully, places the *Terebripora* d'Orbigny as a synonym of *Hippothoa*. D'Orbigny suggested,† and Mr. Hincks repeats in a note “that members of the genus burrow in the shells of certain Molluscs,” and “our common *H. divaricata* erodes to some extent the surface to which it is attached; and the position of its cells, after their removal, is often marked by a very distinct depression” (p. 286). On account of their burrowing habits, Dr. Fischer‡ referred four Jurassic species to the perforating group, as follows :—

Terebripora propinqua Fischer. Oxford Clay : Ardennes.
 „ *arachne* „ „ Calvados.
 „ *producta* „ Kimmeridge : „
 „ *Michelina* Terq. sp. Infra-lias, Hettange.

In his remarks, however, on a new species of this Genus *Terebripora capillaris*, Dr. Dollfus|| has reviewed the whole of the literature of the subject, and the student is referred to that paper for special details. As regards the present form I have no evidence that *S. Phillipsii* burrows in, or even erodes the shell to which it is adherent, and the peculiar character of the Zoœcia, the mode of branching, and the absence of the long caudate appendages, appear to me sufficiently characteristic to separate both *Cellaria Smithii* and *S. Phillipsii* from either *Hippothoa* or *Terebripora*, as described by d'Orbigny, Fischer, Dollfuss, and Hincks. The position assigned to *Cellaria Smithii* by Haime is in the Fam. Escharidæ, as follows :—

Hippothoa Smithii, Haime. Juras. Bryoz., p. 217.
 = *Celleria Smithii*, Phill. ; *Hippothoa Smithii*, Morris, Cat. Brit. Foss.

Alecto Smithii, d'Orb. Prodr. de Palæont., t i., p. 317, 1850.

Terebripora antiqua, d'Orb. Prodr. de Palæont., t i., p. 318,

* British Marine Polyzoa, p. 286. † Terr. Cret. vol. v. p. 424.

‡ O. Fischer de Bryozoa perforants ; Nouvelles archives du Mus., t ii., 1886.

|| 1877, Bryozoaire Nouveau du Terr., Dévonien du Cotentin Bulletin de la Soc. Linn., 3rd ser. vol. i., pp. 1-16, pl. i., f. 3.

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1850, is the only other Jurassic form placed in the Family Escharidæ by Haime.

2. *Stomatopora intermixta*, sp. n., pl. (XII.), figs. 4 to 4b.

Zoarium adnate, creeping, forming a series of reticulations by the anastomosis of the short branches, which are characteristic of this species. The *Zoœcia* are unlike ordinary *Stomatopora*. To the naked eye the cells seem to be much inflated, basally, but under the microscope this deceptive feature is soon resolved; the short tubular *Zoœcia* are then found to be of the ordinary uniserial *Stomatopora* type, beneath which there is a basal lamina similar in substance to the cell itself, and upon which the cell rests; peristomes raised, aperture orbicular. Occasionally two or three cells run in parallel lines, giving to the *Zoarium* a most peculiar Proboscincæ feature.

Horizon and Locality: Cornbrash, Thrapston.

Habitat: On *Ostreæ*.

In general habit *S. intermixta* resembles *Aulopora intermedia* Goldfuss (*Petrifac.*, p. 218, t. 65, f. i.), but it differs from that species by the possession of the basal lamina already referred to.

3. *Stomatopora dichotoma*, Lamx.

1821. *Alecto dichotoma*, Lamx. *Exp. meth. des genres des Pol.*
p. 84, pl. lxxxi., figs. 12, 13, 14.

1822. „ „ W. D. Conybeare and Wm. Phillips.
Outlines of the Geology of Eng-
land and Wales, p. 214.

1854. *Stomatopora dichotoma*, Haime. *Descr. des Bryozoaires*
Foss. de la Form. Juras. p. 160;
pl. vi., f. 1.

1889. „ „ E. A. Walford. *Quart. Jour. Geol.*
Soc., vol. xlv., p. 563. Under the
last two references the whole bi-
bliography of the species is given
up to date.

The true *S. dichotoma* as given, and so ably described by Haime, is not abundant on the fossils of the Thrapston horizon. I have, however, good typical examples encrusting *Terebratula maxillata*, from the Great Oolite, Kidlington, Oxon, which conforms, in every particular,

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to that which Mr. Walford (op. cit. p. 563) speaks of as agreeing with Haime's figures (Juras. Bryoz. pl. vi., fig. 1). The Cornbrash examples are like the shorter form "as figured by Reuss." It is this shorter variety, which I referred to in my Caen and Ranville Paper,* and I found that the species varied accordingly with the habitat which formed the home of the colony. The robust forms were adherent to *Terebratula*; the slighter ones to *Heteropora*.

Horizon and Locality: Cornbrash, Thrapston.

Habitat: on *Terebratula* and *Ostreæ*.

4. *Stomatopora* Waltoni, Haime. Pl. (XII.), figs. 5—5c.
 1854. S. Waltoni, Haime. Desc. des Bryoz. de la form. Juras. pl. vi., figs 2 and 3.
 1882-3. „ „ Vine. Report on Fos. Polyzoa, Brit. Assoc. Rep. 1883, p. 3 of Report.
 1884. „ „ Vine. Quart. Jour. Geol. Soc., p. 787.
 1888. „ „ Vine. Notes on the Caen & Ranville Polyzoa, Northampton Journ. Soc. Nat. Hist., p. 13.

There are several examples of this species in the collection of Mr. Jesson, some of which are of the ordinary type, whilst a few of them approach nearer to *Stomatopora dichotomoides*, *D'Orb.*

Horizon and Locality: Cornbrash, Thrapstone.

Habitat: On *Ostreæ* generally.

5. *Stomatopora*? (*Proboscina*) Desoudini, Haime.
 1854. *Stomatopora* Desoudini, Haime, Des. des. Bryoz. de la Form. Jurassique, p. 165, pl. vi., f. 5, a, b.

This species Haime places doubtfully amongst the *Stomatopora* group. Both in the peculiarity of the Zoarium and in the arrangement of the cells it may be regarded as a kind of duplex form, partly a *Proboscina* and partly a *Tubulipora*. The form described by the author is from the inferior Oolite of Longwy. One very small example is all that I have found encrusting Cornbrash fossils (Echinoderm); but without other examples to judge from it will be better to leave the species, the last of the *Stomatopora* group described by Haime, just where the author left it. See his remarks (op. cit. p. 165).

* Vine, Journ. Soc. Nat. Hist. Northampton, vol. v., p. 12, 1888

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Localities : Inferior Oolite, Longwy (Terquem); Cornbrash, Thrapston, Northamptonshire.

Genus PROBOSCINA.

1826. Proboscina, Audouin, 1838 : Criserpia, Edwards, 1847 ;
Idmonea, d'Orbigny, 1852 ; Proboscina, d'Orbigny.
Palæont. Française, vol. v., p. 844.

The species of this genus may be regarded as so many passage forms, which conveniently link together uniserial Stomatopora on the one side, and Diastopora on the other. By many modern workers on the Polyzoa group the genus is disallowed. Mr. George Busk in the III. British Mus. Catalogue (1875), and Mr. Hincks in the British Marine Polyzoa (1880), unite under one head, uniserial and multi-serial forms. Neither Mr. A. W. Waters, in his various papers on Australian Fossil "Bryozoa," nor Dr. Pergens, in his revision of d'Orbigny's Cretaceous "Bryozoa," make any distinction in the grouping of the forms generally characterised as Stomatopora and Proboscina. The use, however, of the two generic names has its advantages, especially when dealing with Jurassic species, and for its adoption I make no further apology. Mons. d'Orbigny, in the Palæontologie Française, vol. v., Terr. Cret., pp. 844-147, has given a very full diagnosis of this genus, one of the distinguishing features of which is that species which are referred to the Proboscina group, commence their zoarial growth from an "egg-cell" (*cellule œuf*). The Rev. T. Hincks, in his history of "British Marine Polyzoa" (1880), remarks (p. 425) that "*Stomatopora* is distinguished by its linear, adpressed, dichotomously branched Zoarium, in which the cells are generally immersed for a great portion of their length, and are not divergent, except in a very slight degree, and then almost exclusively towards the very extremity of the branches. The most marked variation within the limits of the genus is found in the forms which have the Zoarium partially free and erect. They constitute the sub-genus *Proboscina* of Smitt." The type species of the sub-genus, however, both of Smitt and Hincks' *Stomatopora incrassata*, Smitt (Brit. Mar. Polyzoa, pl. 59. fig. 2) differs from the ordinary *Proboscina* species found in the Cornbrash rocks. A much better idea of the group can be obtained by a careful study of the figure

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and text of *Stomatopora dilatans* (Brit. Mar. Polyzoa, p. 420, pl. lvii., figs. 3, 3a), in which the position of the "egg cell" is a very characteristic feature of the species.

The British Jurassic species of *Proboscina* heretofore described are few in number. Up till 1852 only four Jurassic forms were referred to the genus by d'Orbigny. Jules Haime, in his Monograph of the Jurassic Fossil Bryozoa, only records five species as legitimate members of the group; the four species of d'Orbigny are placed in the doubtful list, but only one of the species described by Haime is placed on the British list.

1. *Proboscina Davidsoni* Haime (op. cit., p. 167, pl. vi., fig. 11, a, b).

Mr. E. A. Walford, in his valuable paper "On some Bryozoa from the Inferior Oolite, &c., of Dorset," (Quart. Jour. Geol. Soc., Aug., 1889) adds considerably to our knowledge of British forms, both specific and varietal.

2. *Proboscina spatiosa*, Walford (op. cit., p. 566, pl. xvii., figs. 1-3.)
3. " " var. *brevis*, Walford (op. cit., p. 567, pl. xviii., figs. 1-2.)
4. " " " *brevior*, Walford (op. cit., p. 567, " " figs. 3-5.)
5. " " *inconstans*, Walford (op. cit., p. 567, pl. xvii., figs. 4-6.)

The following Cornbrash species must now be added to this meagre Jurassic list :—

1. *Proboscina obscura*, sp. n., pl. (XIII.), figs. 7-7b.

Zoarium zigzag or serpuliform, wholly adherent by the base, but slightly raised in the middle portion. *Zoecia* stunted; or partially obscured in certain portions of the zoarium, or developed, *Idmonea* like, on other portions; irregularly disposed and occasionally elongated; surface transversely banded or punctured, aperture circular, placed at the extremity of the cell; peristome thin. *Ooecium*? *Lepralia* like, slightly distended in the central portion, and punctured in transverse lines across the surface.

Horizon: Cornbrash, Thrapston.

The example is unique, and it differs in many respects from all the other species met with in my Cornbrash material; but more especially in the *Lepralia*-like form of the *Ooecium*.

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2. *Proboscina divisa*, sp. n. Pl. (XIII.), figs. 8, 8a.

Zoarium fenestrate, much branched, narrow ; branches anastomosing at frequent intervals. *Zoecia* elongated, or stunted, generally from two to three, on the surface of the branches ; but occasionally the cells are irregularly clustered together in places where the branches divide, and form a fenestrule.

Locality and Habitat : Cornbrash, Thrapston.

The examples of this species are by no means abundant, and though I have frequently met with fenestrated *Proboscinae* in other horizons of the Jurassic rocks, forms similar in any sense to the one described above are extremely rare, even in the Cornbrash rocks of Thrapston.

Proboscina clementina, Vine. (Proc. Yorksh. Geol. Soc., vol. xii., p. 154, pl. vi., fig. 2.)

3. „ var. *minuta*, var. n., Pl. (XIII.), 9, 9a, 9h.

Zoarium, fan-shaped, or flabellate, delicate, originating from an "egg-cell." *Zoecia*, contiguous, adherent by their bases only, the upper parts of the cells slightly elevated and rounded ; partially free towards the orifices, the peristomes turned upwards ; surfaces of *Zoecia* striated transversely. The basal part of the cells occasionally distended, or pointed, just above the aperture, (Pl. (XIII.), fig. 9b.)

Horizon and Locality . Cornbrash, Thrapston, Northampton.

Except in the size of the colony, these two Cornbrash *Proboscinae* closely resemble the Gault forms already described by me in a former paper (Proc. Yorksh. Geol. Soc., vol. xi., pl. ii., p. 154). The distinguishing feature in the *Zoecia* of the Jurassic forms, however, merits recognition and description.

Proboscina clementina. Vine.

4. „ Var. *depressa*, var. n.

The beautiful and delicate variety described above (*P. clementina*, var. *minuta*), is the form more generally met with encrusting Cornbrash Fossils ; but there are several other varieties which would merit distinction if a more critical diagnosis were adopted. One peculiar example, however, in my possession, has the *Zoecia* rather more robust and depressed than in the var. *minuta* (No. 3, ante.). This may be the result of habitat only, but even this difference may be recognised advantageously.

Locality and Habitat : on Echinoderm.

5. *Proboscina ornata*, sp. n., pl. (XIII.), figs. 10, 10a, 10b.

Zoarium flabellate, or very irregularly disposed ; some portions of the *Zoarium* apparently thickened by a secondary growth of cells. *Zoecia* contiguous, rather larger than the ordinary cells of the *Proboscina* species previously described ; cells thickly and minutely punctate, aperture circular. *Oecia* very conspicuous and frequent, generally having a globular outline. In some portions of the *Zoarium* there are occasional cells, which differ considerably from the ordinary ones ; these are short or stunted, very broad across the central portion, but with apertures similar to the regular cells ; surface (smooth when worn), but normally the cells are finely punctate.

Locality and Horizon : Cornbrash, Thrapstone ; generally on the shells of Echini.

This beautiful species is not altogether rare, but examples showing the peculiar *Oecia* are not abundant. The example selected for diagnosis have at least four, and associated with these are several of the modified oeciel cells referred to in the text. The colonial growths of the *Zoaria* are similar in some respects to the *Zoaria* of the next species which I shall describe, but the *Zoecia* are more depressed, and when superficially examined by a hand-glass somewhat pellucid. On account of this peculiarity I referred to the forms in my original MS. notes as *Proboscina pellucida*, when returning the greater bulk of the fossils to Mr. Jesson.

6. *Proboscina Thrapstonensis*, sp. n. Pl. (XII.), figs. 6-6d.

Zoarium flabelliform, fan-shape, lobulate or irregular, forming large and small patches, or colonial growths, and wholly adherent to a variety of fossils : *Ostreae*, *Terebratula* species, and *Echinoderms* especially. *Zoecia* depressed, contiguous by their whole length, and nearly of equal breadth throughout : surface of the cells flat, occasionally slightly rounded in the upper portions, especially in the newer cells, on the margins of the zoariums ; aperture circular, with a thin peristome placed at the extremity, depressed, or very slightly raised upwards just below the orifice. In the younger cells the surface is densely punctate ; in the older cells this feature is obscured by a thin coating of calcareous matter.—Ovicells ?

Locality : Cornbrash, Thrapston.

This is by far the most abundant species of all the Cornbrash Polyzoa.

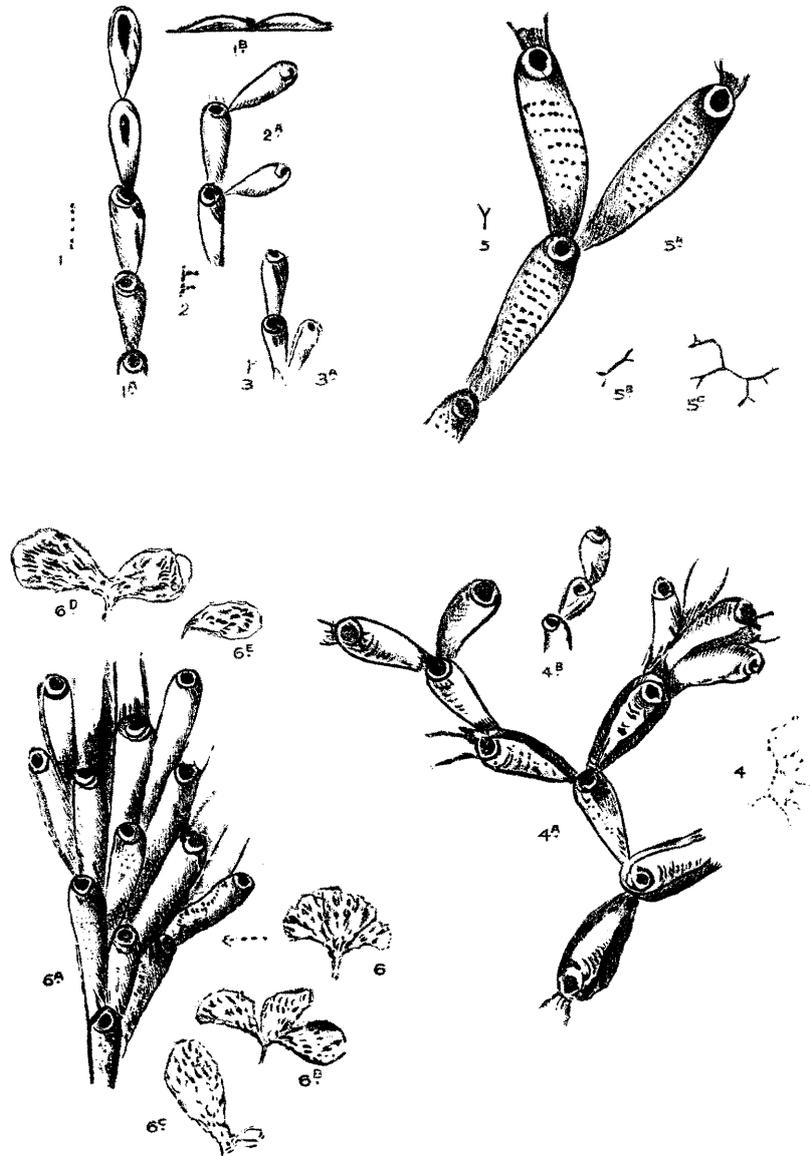
DESCRIPTION OF PLATES A AND B.

PLATE XII.

- Figs. 1-1*a*. Stomatopora Phillipsi, Vine. The largest colony found.
 „ 2-2*a*. „ „ „ Another colony.
 „ 3. „ Phillipsi ? slightly varying from the above.
 „ 4. „ intermixta, Vine, natural size.
 „ 4*a* & 4*b*. „ „ „ enlarged.
 „ 5*b*-5*c*. „ dichotoma, Lamx., various colonies.
 „ 5 & 5*a*. „ „ „ enlarged.
 „ 6-6*a*. Proboscina Thraptonensis, Vine type.
 „ 6*b* to 6*d*. „ „ various colonies.

PLATE XIII.

- „ 7-7*b*. Proboscina obscura, Vine.
 „ 7*a*. „ „ Oœcium (?)
 „ 8-8*a*. „ divisa, Vine.
 „ 9-9*b*. „ clementina, Var. minuta, Vine.
 „ 10. „ ornata, Vine. Colonial growth of Zoarium
 marked *a* and 10*b*, showing two sets of
 Oœcia.
 „ 10*a*. „ ornata. Oœcial chambers from the left-hand
 side of the fig. 10, marked *a*.
 „ 10*b*. „ ornata. Oœcial chambers from the right-
 hand side of the colony, marked 10*b*.



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Proc. Yorksh. Geol. & Polyt. Soc., Vol. XII., Pl. XIII.



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